

A 130 km westward range extension of *Montivipera xanthina* (Serpentes, Viperidae) in mainland Greece

Ilias Strachinis¹, Dionisios Iakovidis², Nikolaos Gogolos², Athanasios Papagoras², Thomas Daftsios²

¹ Department of Genetics, Development and Molecular Biology, School of Biology, Faculty of Natural Sciences, Aristotle University of Thessaloniki, University campus, 54636 Thessaloniki, Greece

² Department of Zoology, School of Biology, Faculty of Natural Sciences, Aristotle University of Thessaloniki, University campus, 54636 Thessaloniki, Greece

<https://zoobank.org/7308F84F-2247-451B-96A7-7D538C938D6C>

Corresponding author: Ilias Strachinis (strachin@bio.auth.gr)

Academic editor: Johannes Foufopoulos ♦ Received 5 June 2025 ♦ Accepted 11 July 2025 ♦ Published 4 August 2025

Abstract

The Ottoman viper (*Montivipera xanthina*) was previously known to occur only as far west as the Rodopi Prefecture, Greece. Here, we report a newly discovered population in the Drama Prefecture, extending the species' known range approximately 130 km westward. The population was confirmed through field surveys, during which several individuals were recorded. Habitat analysis suggests that this population is more likely part of a previously undocumented, continuous range, facilitated by suitable ecological corridors. Our findings underscore the underexplored biodiversity of Eastern Macedonia and Thrace and highlight the need for further herpetological surveys in the region. This range extension has important implications for conservation planning, biodiversity assessment, and public health preparedness.

Key Words

distribution, field survey, Greek, habitat, occurrence, Ottoman viper

Montivipera Nilson, Tuniyev, Andrén, Orlov, Joger & Herrmann, 2001 is a genus of large vipers, endemic to Western Asia and barely extending into Europe, ranging from Greece's northeastern coasts and Aegean islands, through Turkey, Lebanon, and Syria, and into central Iran (Stümpel et al. 2016). The genus *Montivipera* comprises two species complexes: the *Xanthina* complex, primarily distributed across Anatolia, the eastern edges of Greece, and fragmented populations in Lebanon and Syria; and the *Raddei* complex, found in Iran, Armenia, and eastern Turkey (Stümpel et al. 2016). The *Xanthina* complex comprises two major clades, the *bornmuelleri* and the *xanthina* clades, separated approximately between the Late Miocene and Early Pliocene, both consisting of several distinct and deeply divergent evolutionary lineages (Stümpel et al. 2016; Ahmadi et al. 2021, 2025).

Although the lineages within the *bornmuelleri* clade are each recognised as distinct species, all four lineages of the *xanthina* clade are currently classified under *Montivipera xanthina* (Gray 1849) (Ottoman viper). A few studies over the past decade have proposed the recognition of three morphological subspecies of *M. xanthina* (Cattaneo 2014, 2017; Afsar et al. 2019). However, these descriptions are limited in scope, based solely on morphological traits derived from small sample sizes, with considerable character overlap between populations and/or proposed subspecies, a lack of statistical significance, and remain unsupported by molecular analyses. Accordingly, we consider the recognition of these subspecies to be tentative and in need of further corroboration through comprehensive morphological and molecular investigations.

The Ottoman viper is the only species of the genus *Montivipera* whose range extends into the European

continent. Its distribution includes northeastern mainland Greece (Thrace), Turkish Thrace, several Eastern Aegean islands, and the Mediterranean coastal regions of Turkey, extending into the interior of Turkey and reaching as far as the Taurus Mountains in the south (Fig. 1A; Böhme et al. 2009; Stümpel et al. 2016; Me-

bert et al. 2024; Ahmadi et al. 2025). The westernmost known limit of its range, until our discovery, was the Kryoneri–Almyros area in the Rhodopi Prefecture, Thrace, Greece (Fig. 1B; Mebert et al. 2024). In mainland Greece, the species appears to favour rocky maquis habitats and seems to be absent from the Evros forests as



Figure 1. Ottoman viper's geographic range. **A.** The currently known global distribution of *M. xanthina*, shown in red, according to Böhme et al. (2009), Stümpel et al. (2016), and Mebert et al. (2024); **B.** The approximate previously known distribution range of the Ottoman viper (*Montivipera xanthina*) in Greece, shown in red (based on Mebert et al. 2024); the newly documented population in the Drama Prefecture, indicated by a green dot; and intermediate localities of unpublished records and photographic evidence of the species, provided by G. Kreiner (pers. comm.), indicated by blue dots. Potential ecological corridors facilitating the species' dispersal are illustrated in orange, based on generalised habitat suitability and elevation. Maps created using QGIS v3.22.9 "Białowieża" (2022).

well as the cultivated lowlands and wetlands of Thrace stretching from the Nestos to the Lissos River. These wetland areas, which are part of the Natura 2000 network (GR1130006, GR1130009, and GR1150010), have been extensively surveyed by researchers and naturalists. In contrast, the foothills and mountainous regions along the northern edge of the Thracian plain remain largely underexplored. Here we report a newly discovered population of *M. xanthina* located approximately 130 km west of the previously known westernmost limit of the species' range, in the western part of the Drama Prefecture, mainland Greece. Furthermore, we present unpublished distribution records that connect this newly discovered population via a potentially suitable habitat corridor from the previously known western localities.

On 8 June 2024, a citizen contacted us requesting identification of a snake filmed near the village of Aggitis (Drama Prefecture). The footage clearly depicted a juvenile Ottoman viper. Initially, we considered the possibility that this observation may have resulted from an accidental introduction, potentially due to the high volume of tourist traffic to the nearby Aggitis Cave, by vehicles arriving from Thrace or even Turkey. It has been documented that snakes can be passively transported by vehicles over distances exceeding 300 km (I.S. pers. documentation, unpublished; numerous cases, including one of a male Ottoman viper that was unintentionally transported on a recreational vehicle (RV) from Alexandroupoli to Themi, Thessaloniki, Greece, in 2021).

To verify the accuracy of this record and assess the potential presence of an established population, we conducted two field surveys in the area (27 October 2024 and 15 March 2025). During these surveys, we documented three additional individuals: two adults and one juvenile. The first adult was observed approximately 100 metres southwest of the initial sighting location, while the other two individuals were recorded about 420 metres northwest of the same point. The area encompassing all confirmed observations, calculated using a Minimum Convex Polygon (MCP) in QGIS v3.22.9, covers 36,318 m² (0.036 km²). One of the adult individuals was captured for documentation. After photographic recording (Fig. 2; Voucher number FC28503, NHMC80.3.41.8) and non-invasive DNA sampling via buccal swab, the specimen was released at the site of capture. The approximate location of the newly documented population is shown in Fig. 1B. To protect the population from potential poaching or other threats, the precise coordinates of all observations have been withheld but are available upon legitimate scientific request.

Although the population in the Aggitis area initially seemed to result from an introduction event, the acquisition and evaluation of additional *M. xanthina* records from several intermediate localities (G. Kreiner, pers. comm.; Voucher number FC28502, NHMC80.3.41.7; see Fig. 1B) suggest that the species may instead maintain a previously undocumented, continuous distribution further westward, extending from the Rhodopi Prefecture to the newly discovered locality, and possibly beyond.



Figure 2. A large male Ottoman viper (*Montivipera xanthina*) recorded in the Aggitis area, Drama Prefecture, Greece (voucher number FC28503, NHMC80.3.41.8), approximately 130 km west of the previously known westernmost extent of the species' range (see Fig. 1). Photo by IS.

This hypothesis is further supported by the existence of a narrow ecological corridor—comprising rocky maquis habitats and low-elevation foothills—that connects these records and runs along the northern margin of Thrace’s lowlands, interrupted only by narrow rivers (e.g., Kompatos and Nestos around the Galani and Paradeisos area), and extends up to the border between the Drama and Serres prefectures (Fig. 1B). Such habitat continuity can provide suitable resources for healthy populations and facilitate the species’ active dispersal.

Our findings significantly extend the known western range limit of the Ottoman viper by approximately 130 km, suggesting a broader distribution than previously recognised. This is important for updating the map of the species’ range and is crucial not only for biodiversity monitoring and conservation but also for public health protocols, as it crosses into new prefectures and municipalities. As a highly venomous snake, its presence may necessitate the revision of envenomation treatment protocols at local hospitals. Additionally, it is of scientific relevance to assess potential ecological interactions, such as competition with other co-occurring snake species, in particular the—more common—Nose-horned viper (*Vipera ammodytes*). Ongoing research aims to further clarify the species’ actual mainland range and to better understand its ecology and genetics.

This study, along with several others published in the past decade that have revealed significant herpetofaunal records (e.g., Strachinis et al. 2019; Christopoulos 2022), underscores the extent to which the region of Eastern Macedonia and Thrace remains underexplored. It also highlights the urgent need for more comprehensive surveys to better understand the region’s species composition, distribution, and population densities.

Acknowledgements

We thank Ioannis Kazas for contacting us and sharing his record of the Ottoman viper. We are also grateful to Sokratis Samaras, Dimitrios Steriakos, and Anastasios Touboulidis for their valuable field assistance, and to Guido Kreiner for generously providing unpublished records and granting us permission to use them. We further thank Petros Lymberakis for his assistance in registering our findings in the database of the Natural History Museum of Crete. The survey was conducted under permits from the Greek Ministry of Environment and Energy (ΑΔΑ: Ψ6Κ44653Π9-Υ41 & ΠΨΧΧ4653Π8-ΒΛΞ).

References

- Afsar M, Yakin BY, Çiçek K, Ayaz D (2019) A new subspecies of Ottoman viper, *Montivipera xanthina* (Gray, 1849), (Squamata, Viperidae) from Geyik Mountains, Mediterranean Turkey. *Ecologica Montenegrina* 22: 214–225. <https://doi.org/10.37828/em.2019.22.17>
- Ahmadi M, Hemami MR, Kaboli M, Nazarizadeh M, Malekian M, Behrooz R, Geniez P, Alroy J, Zimmermann ME (2021) The legacy of Eastern Mediterranean mountain uplifts: rapid disparity of phylogenetic niche conservatism and divergence in mountain vipers. *BMC Ecology and Evolution* 21: 130. <https://doi.org/10.1186/s12862-021-01863-0>
- Ahmadi M, Hemami MR, Kaboli M, Ghane-Ameleh S, Malekian M (2025) Conservation biogeography of mountain vipers: A phylogenetic niche modelling approach. *Diversity and Distributions* 31: e13955. <https://doi.org/10.1111/ddi.13955>
- Böhme W, Lymberakis P, Tok V, Ugurtas IH, Sevinç M, Crochet PA, Kaska Y, Kumlutaş Y, Avci A, Üzümlü N, Yenyurt C, Akarsu F (2009) *Montivipera xanthina* (errata version published in 2016). The IUCN Red List of Threatened Species 2009: e.T61537A86548598. <https://doi.org/10.2305/IUCN.UK.2009.RLTS.T61537A12509884.en> [Accessed on 05 June 2025]
- Cattaneo A (2014) Variabilità e Sottospecie di *Montivipera xanthina* (Gray, 1849) nelle isole egee orientali (Reptilia, Serpentes, Viperidae). *Naturalista Siciliano* 38: 51–83.
- Cattaneo A (2017) Note Sull’erpetofauna Dell’evros Sud-Occidentale (Grecia Ne) E Nuovo Contributo Alla Conoscenza Di *Montivipera xanthina* (Gray, 1849) Della Tracia Greca Centro-Orientale, ConDescrizione Di *Montivipera xanthina occidentalis* subsp. nova (Reptilia, Serpentes, Viperidae). *Naturalista Siciliano*, S. IV, XLI (1) 53–74.
- Christopoulos A (2022) New record of *Telescopus fallax* (Squamata, Colubridae) in Rhodope Prefecture, Thrace, Greece. *Herpetology Notes* 15: 873–876.
- Meberth K, Strugariu A, Cattaneo A, Roussos SA, Martínez-Freiría F, Strachinis I, Çiçek K, Stümpel N (2024) *Montivipera xanthina* (Europe assessment). The IUCN Red List of Threatened Species 2024: e.T61537A207990775. <https://doi.org/10.2305/IUCN.UK.2024-1.RLTS.T61537A207990775.en> [Accessed on 01 May 2025]
- QGIS Development Team (2022) QGIS Geographic Information System v3.22.9. Open Source Geospatial Foundation Project.
- Strachinis I, Karagianni KM, Stanchev M, Stanchev N (2019) No one ever noticed: First report of *Zootoca vivipara* (Lichtenstein, 1823) in Greece. *Herpetology Notes* 12: 53–56.
- Stümpel N, Rajabizadeh M, Avci A, Wüster W, Joger U (2016) Phylogeny and diversification of mountain vipers (*Montivipera*, Nilsson et al., 2001) triggered by multiple Plio–Pleistocene refugia and high-mountain topography in the Near and Middle East. *Molecular Phylogenetics and Evolution* 101: 336–351. <https://doi.org/10.1016/j.ympev.2016.04.025>